Exploring the Impact of Artificial Intelligence on Mental Health Interventions

By

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Abstract

Purpose: To keep the early clinical improvements from mental health treatments, longer-term intervention programs may be necessary. Nevertheless, this may not be doable because of how intense early intervention programs that include face-to-face interactions are. To avoid the intervention's advantages from eroding, it may be cost-effective and engaging to use internet-based treatments tailored to kids as an adjunct. Nevertheless, the delivery of therapeutic information in online interventions has traditionally been handled by human moderators. Customized online treatment cannot be informed without more advanced models that are sensitive to user data. Therefore, to reimagine online treatments for adolescent mental health, it is essential to combine user experience with advanced and innovative technology to provide information. The web application offers supervised social therapy. In this presentation, we will go over the key aspects of the system and talk about our ongoing projects including using AI and sophisticated computational approaches to make the system more user-friendly and better at finding and delivering therapeutic material.

Method/Findings: As a case study, They look at the ongoing Horizons site, which is a randomized controlled experiment that followed children as they recovered from early psychosis for five years. They are using MOST to power this experiment. They go over the background of the project, the main features, and how to utilize the web app. Along with highlighting some of the system's shortcomings, we go over some of the advancements made to the system, such as the inclusion of relevant use patterns. As a result, we are now driven to improve the system with new mechanisms for treatment material distribution and to increase user engagement via the application of computational and artificial intelligence approaches. To customize interventions and scale the system, we focus on how we have used chatbot technology and natural language analysis.

Recommendations/ Results from the many clinical studies conducted so far have confirmed the practicality of the novel MOST system. An essential next step in the advancement of the software system is to include sophisticated and automated content delivery techniques. This will allow for more data-driven possibilities, better analysis of use trends, and the possibility of large-scale deployment (Boucher et al., 2021) .

Keywords: mental health in young people, psychosis, depression, computational health, chatbots, and sentiment analysis

Introduction

Programs that help young people who are showing symptoms of mental illness early sometimes only last for two years. These programs provide specialized therapy and support. The typical duration of treatment in early intervention programs for schizophrenia, for instance, is twenty-four months. One Australian national charity, Headspace, provides early intervention mental health services to kids and sets a yearly limit of 10 sessions for psychological. Therefore, not all benefits of expert therapy may last once treatment has ended. Young people are more prone to relapse if they feel disconnected from mental health institutions upon discharge and referral to general mental health care. Studies show that as many as 80% of young people who have symptomatic remission from psychosis or depression go back to their initial condition.

In response to these issues, online solutions have emerged in the last few years. An exciting new opportunity exists for the improvement and, maybe, revolutionization of mental health therapies via the use of modern means of communication and information technology. Given the widespread interest in new technology among young people, internet-based treatments for mental health issues may be attractive and beneficial for these patients. Daily, more than 97% of young people use the Internet. Álvarez-Jiménez et al. (2012) state that novel therapies using these technologies may maintain the beneficial clinical results of specialized therapy while also greatly increasing service accessibility and participation. Results from internet-based therapy have been proven to have good benefits, including lowering stigma, boosting self-disclosure, decreasing isolation, and leading to supportive contacts. Specifically, young individuals with mental health concerns may benefit greatly from programs that center on social networking. Due to the stigma associated with mental illness, many young people who suffer from it have interpersonal challenges and isolation.

Research has shown that young people who regularly use social networking sites have better

socialization experiences, more self-esteem, more positive connections, easier communication, and a stronger sense of belonging to a group. For teenagers in danger of social isolation, this emphasizes the relevance of these platforms. Because of these benefits, young people may develop a stronger attachment to their online social networks, leading to increased engagement and use of these sites (Denecke, Abd-Alrazaq and Househ, 2021).

Body

Two questions, which are listed below, prompted the launch of the MOST project:

1. What is the efficacy of online therapy? Is it possible to substitute online psychosocial intervention with specialized in-person programs aimed at adolescent mental health?
2. How can we design and implement effective forms of interactive technology to support young people with mental illness?

A new level of investigation has emerged.

1. How can state-of-the-art computational and AI technologies be integrated into the MOST model and platform to enhance the support provided by moderators and physicians and automate therapy according to each patient's unique requirements, thereby increasing the platform's and model's utilization?

The social networking function is the one that people use the most, according to research on the MOST sites. Even in the face of encouraging usage numbers, we will not rest until we have improved the delivery of the therapeutic elements of the system to our consumers. This essay primarily focuses on answering the third issue by using various recent discoveries and research on the subject. We will use the Horizons site as an example since it is the most widely utilized implementation and has been live for the longest amount of time (Ebert et al., 2019) .

Accessing Site Content

The development team has put a lot of time and energy into figuring out how to make the online treatment material in MOST the most engaging, relevant, and effective it can be for users. Using a theory-driven approach to online human assistance, MOST adheres to a positive psychotherapy methodology.

Iterative prototyping and participatory design were the driving forces behind the production of treatment material in the MOST sites, including input from users and professional adolescent mental

health therapists. More leeway to include social networking, therapy, and the moderating component was provided by the software system's custom design approach. On their journey to recovery, young people may study and practice therapeutic practices in a therapeutic setting. They can also acquire perspective and validation, and work through challenges in a transitional social network. Users, physicians, psychological experts, and professional youth writers collaborated in the modules' creation. The key components of the MOST system are as follows:

The Cafe is a social networking site that looks like Facebook. Users may post and comment on stories, provide and receive support, and find new perspectives and encouragement. Users may also get information about open positions in the app's Job Zone, and a feature called Team Up allows users to set personal challenges and ask others to either participate or just support them.

Steps are interactive therapy modules that may be used to exercise and enhance a range of psychological capacities. Collaborating with top comic developers, clinical psychologists, professional creative writers, and young people, they generate engaging content that might be used as treatment. An incorporated kind of social involvement within stages, "Talking Points" are questions that promote user-to-user communication and the sharing of personal experiences.

"Talk It Out" is an online forum where people may discuss topics they're stuck on in small, monitored groups that follow a model derived from research on how to solve societal problems. Following a user nomination and moderator framing of a problem, other users provide and discuss possible solutions, and the moderator then briefly summarizes the conversation. Talk It Outs has been completed 75 times: A user-nominated problem was resolved via an active forum, but the ultimate result a searchable and reusable user-generated "knowledge base" repository was what made a difference (Graham et al., 2019).

Discovering Content

The most fundamental and immediate methods for users to access activities and processes are via the key navigation menu links and the ever-present search box. Search bars are a common interface feature in the modern "Age of Search" due to their prevalence. For now, all you can do is enter a basic search word and the search function will check the system for relevant material. Interestingly, it is used more for searching the website's users and features than for treatment material, and it is not used very often. We are currently looking into the potential of revamping this UI feature. As time goes on, a more customized "oracular" search box may be able to take the user's expressive input and direct them to pertinent therapeutic content.

In the steps section, users will find an attractive grid with all the steps displayed in alphabetical order with their respective icons, as shown.
With the possibility that users would be inspired to join in by seeing what their friends are doing, we've included a page labeled "Steps People are Taking." This page has four access links:

1. Steps: Out of all the steps taken by these four options, this link was responsible for 48 percent of the visits.

2. The steps that have everyone talking: At different points throughout the steps, users are given the chance to comment on Talking Points. With this setting, the steps that have received the most Talking Point comments will be chosen. This makes up fourteen percent of all trips to the step.

3. Most frequently used steps: These steps make up 11% of all step visits.

4. Undiscovered Gems: A low-key way to break up information cascades and highlight the least-done actions to encourage the more popular ones. This link represents 27% of all step visits from these four possibilities, therefore it appears that the euphemism was successful.

The user experience for actions is somewhat similar, and they may also interact with activities via the "Powered by your Strengths" tab. When users sign up for the system, they have the option to perform an introductory exercise that asks them to choose five strengths out of twenty-four. Curiosity, Creativity, Discretion, and Courage are a few examples of strengths. This option only shows users activities that are related to the strengths they've selected, and strengths are linked to relevant ways they may be used (Gupta, Malik and Sinha, 2022).

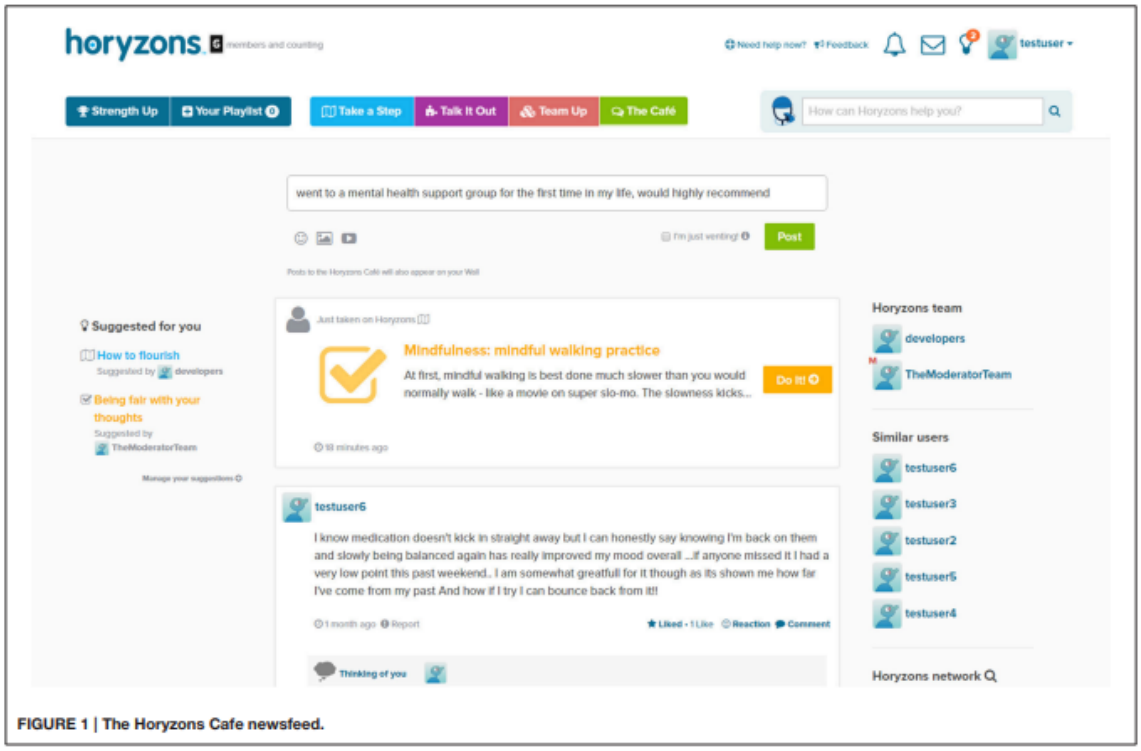

FIGURE 1 | The Horyzons Cafe newsfeed.

Figure 1 The Horyzons cafe newsfeed.

While these structures do provide an easy way to access material, it would be great if they were complemented by more complex, automated solutions that are suited to each user. As a foundation for the rationale for this addendum, the following concerns about the shortcomings of these conventional access choices are provided. One easy and efficient way to discover stuff is via a search bar. On occasion, however, a user may not want to seek something specific or may not have the correct search phrase in mind.

It is also possible that their actions on the site indicate that they could get an advantage of something of which they are unaware.

If a person is interested in perusing the treatment material or is motivated to seek anything specific, direct menu connections would be helpful. We can't always rely on people to do this, however, and it won't happen very frequently.

Therefore, we want to create more advanced methods of content distribution rather than assuming people are always seeking material or know exactly what they want to look for. They begin with the premise that users could benefit from more sophisticated taxonomic help when trying to locate relevant material. Because of this thought, a tag-based system was implemented.

Therapy Tags

Therapeutic content tackles specific groupings of symptoms (such as anxiety) or talents (such as social ability) via the use of tags to construct meaningful categories. By categorizing individuals according to their emotional states and current requirements, both users and doctors may discover or propose information that is uniquely suited to each person (Lee et al., 2021).

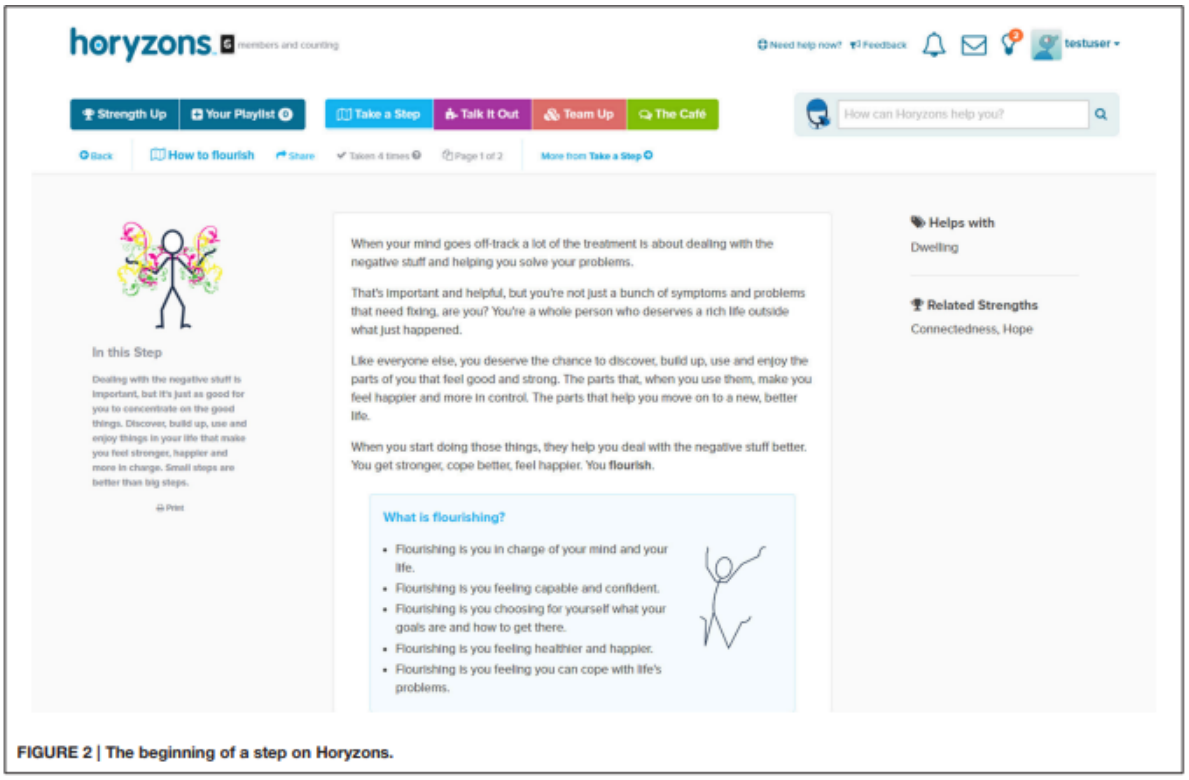

Figure 2 Beginning of steps.

Human-Supported Engagement

The MOST system does more than only provide taxonomic and navigational frameworks for accessing treatment information; it also directly sends users recommendations for particular content. Moderators' ability to choose material to recommend to users has been a part of the MOST system from the beginning.

Because trustworthy experts who are both responsible and knowledgeable about the site's content may boost positive user motivation, staff moderation has proved crucial in increasing adherence. Moderators serve as role models for users, preventing them from abusing the system while simultaneously encouraging their usage and enhancing the user experience. Seven clinical

psychologists and a clinical social worker make up the moderating team. A youth participation expert and a vocational worker moderate certain topics. When deciding on a course of therapy, moderators take several factors into account, such as the user's profile, previous interactions, and current activity level on the site. For example, during a chat with one of our users, one of our moderators found out about the user's new employment. The moderator suggested the "Strengths for work" module based on the user's informational gaps and the fact that they hadn't selected any strengths; this module helps users better understand and apply their work strengths.

The system records the time at which a user finishes a piece of suggested material. Either the client or the moderator may decide against the proposal. This data will presumably be used by the moderators to influence their choices on future proposals (Olawade et al., 2022).

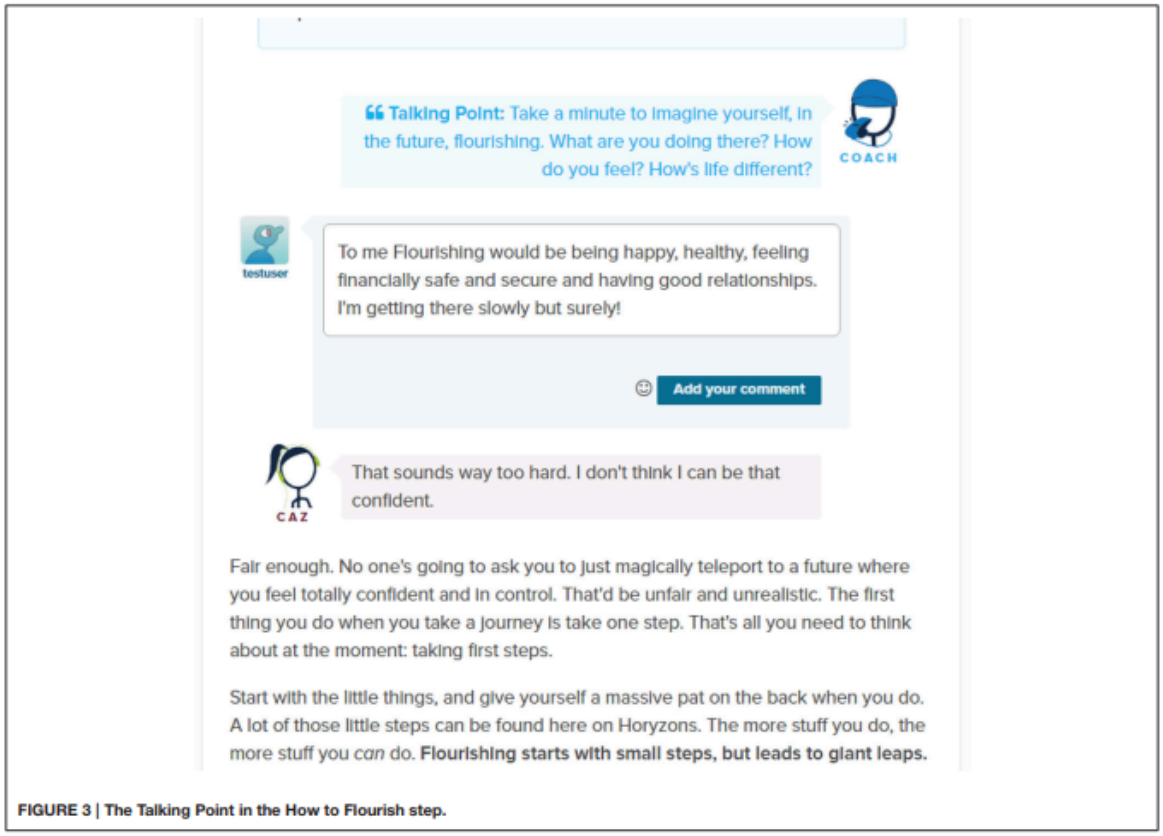

Figure 3 Flourish Step

Automated Suggestions

While our present websites rely heavily on human moderator recommendations, we are looking into automated content distribution options to see whether they might improve user engagement. This will supplement our current models and solve any potential shortcomings.

Among the many advantages that automated recommendations have over suggestions made by moderators is the fact that they are available at all times and may be provided to the user instantly. A larger user base may be more easily attained with the use of automatic suggestions. Instead of hundreds, thousands, or even more individuals, the MOST platform is now being utilized in research settings with smaller groups, often ranging from 30 to 100 people. Each moderator is given a fair amount of people to manage and reply to. Although these automated therapy suggestion methods are more of a supplement than a replacement for moderator suggestions at the moment, automation becomes a critical objective given the objective of expanding and launching the MOST platform in a less restricted or even unmoderated publicly accessible environment (Shah, 2022).

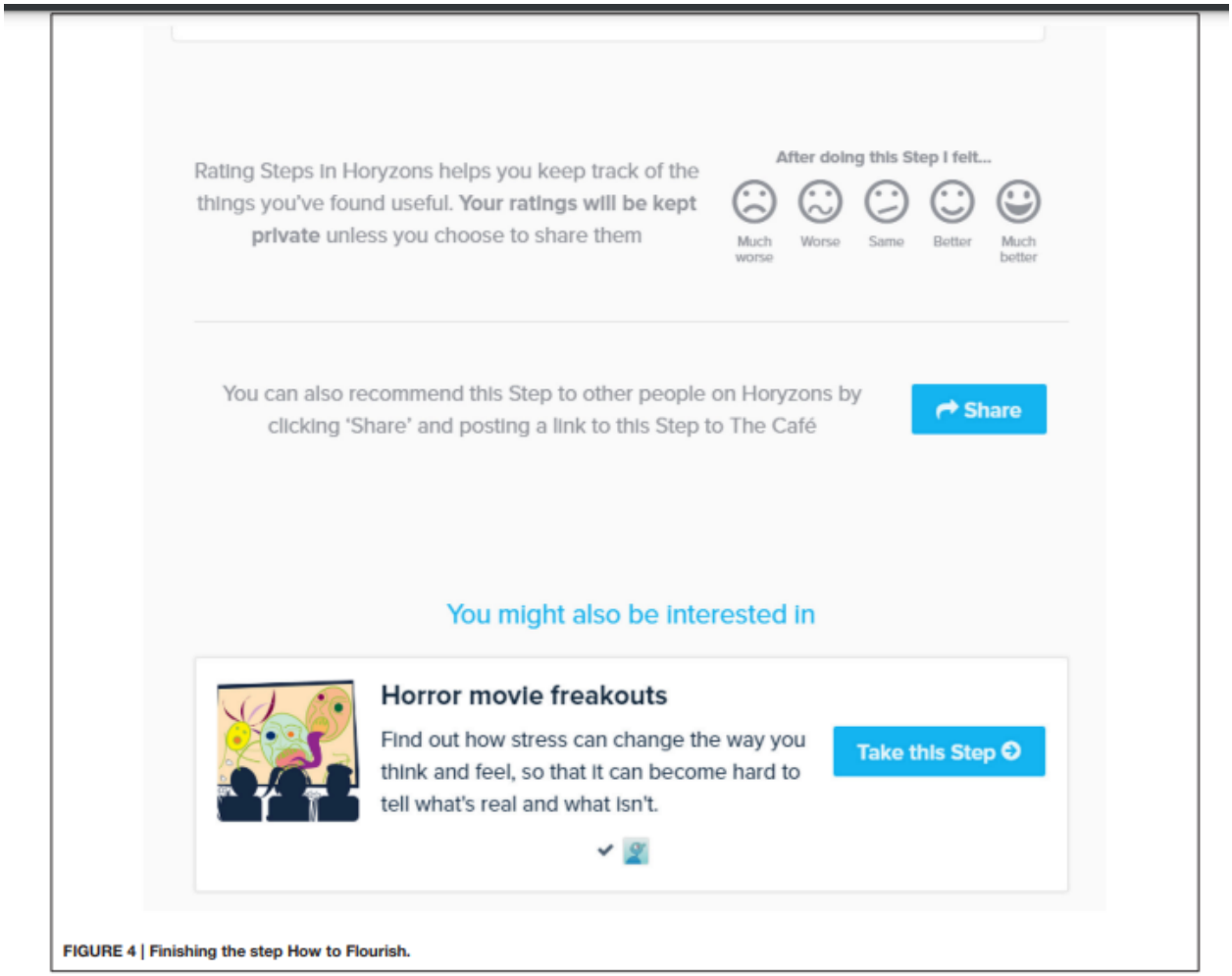

Figure 4 Finishing Step

Instead of relying on moderator recommendations, these two elements provide a simple and inexpensive method to promote treatment material. No human intervention is required; the user gets the idea instantly; and when they engage in further actions, other suggestions relevant to their current

activity will pop up on their screen. But that doesn't mean their distribution is instantaneous or personalized to the individual. Such concerns are now addressed by a newly integrated function that links the user's newsfeed posting behavior with recommendations for therapeutic material. We can extract some information to base content recommendations on by linguistically analyzing user posts. An algorithm immediately begins analyzing the user-submitted content to identify one relevant step and action. Some problems and concerns about usability have been generated by the presentation of these proposals.

It may take up to 10 seconds to compute these recommendations because of the computations and API calls that are necessary. Because the computation occurred sequentially before the item was posted to the newsfeed, users were first confused about what was occurring, which was a major issue from an interaction standpoint. So, we figured it would be best to compute the recommendations simultaneously with the post. "Horyzons has suggestions based on your post" appears above the post when it is added to the newsfeed. The system will try to obtain the recommendations and show them above the post if the user hits the "Show Me" button next to this message. If the calculations for the ideas have not been completed yet, a "Delivering your suggestions" message and a dynamic progress graphic will be shown by the system (Shiri Sadeh-Sharvit et al., 2023).

Next to it, we write, "These suggestions are only visible to you." This is to encourage people to feel safe and unique.

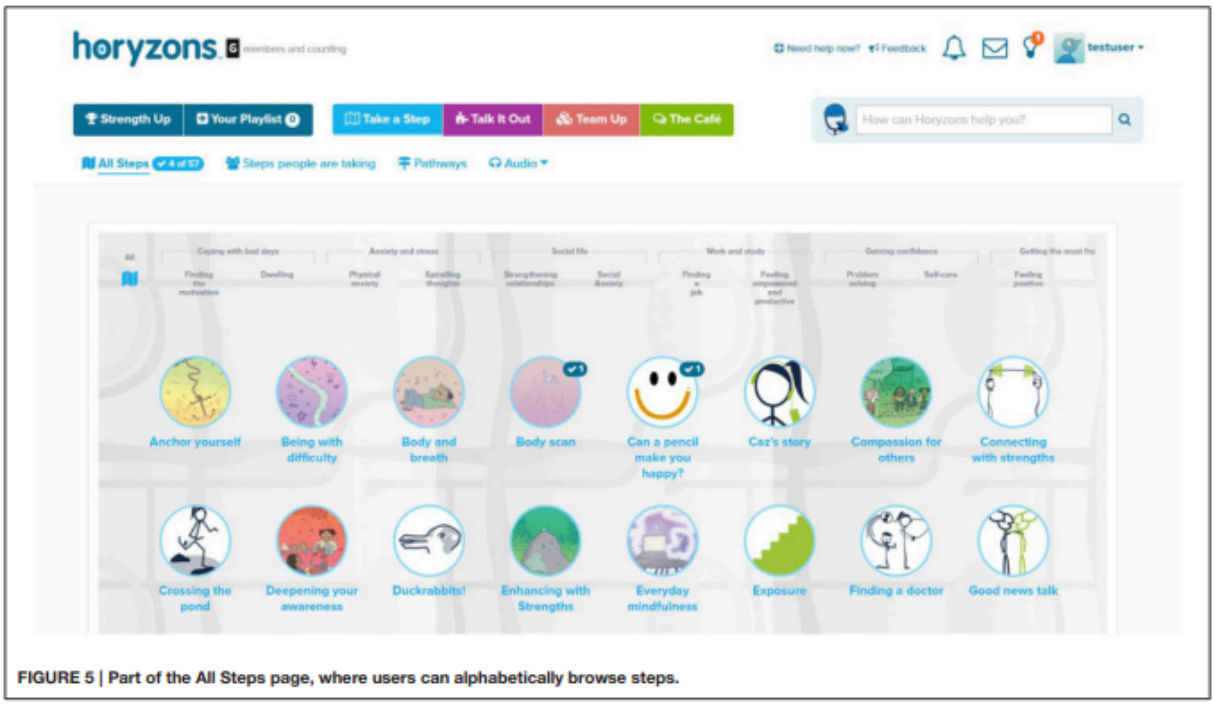

FIGURE 5 | Part of the All Steps page, where users can alphabetically browse steps.

Figure 5 Browser steps.

Chatbot

An AI chatbot may converse with users by text or voice using an online chat interface, simulating human conversation. Some systems employ simple rule-based replies and keyword matching, and then some systems use complex methods from ML and NLP. Machine learning (ML) focuses on programs that can learn from their data and adapt to new situations without human intervention, whereas natural language processing (NLP) focuses on computers' capacity to comprehend and work with natural language. The idea of a user entering data and then receiving a response from a bot, regardless of its intelligence, remains novel. When bots can imitate human speech patterns, it might lead to a more realistic experience for users.

A bot's defining feature is its ability to simulate natural speech patterns, giving the impression that the user is engaging in conversation with a real person. This is in contrast to search engines and applications, which may often provide an immediate result when a user enters a query. Creating chatbots with the ability to identify and effectively respond to a person's emotional state is a crucial component, particularly in the field of psychology and therapy. Adding to this problem is the difficulty of making chatbots intelligent enough to understand and use the rules of natural language. Affective computing has been the source of certain new developments in emotionally intelligent AI. Big internet giants like Google, Facebook, and Microsoft are investing heavily in chatbots, so it's little wonder they're all the rage right now. Online customer support, conversational product searches, and

event planning are just a few of the many business uses for chatbots. While we aren't necessarily looking to integrate chatbots into MOST or any other online mental health platform, the current commercial interest in them is a perfect opportunity to do so. Psychology has a significant role in the development of chatbots. The first widely used chatbot, ELIZA, was originally designed to mimic a Rogerian psychotherapist aside from the intriguing philosophical and psychological concerns it poses. It wasn't until 1995 that a more advanced version of ELIZA, called A.L.I.C.E., appeared online. Its work led to the introduction of AIML, a general-purpose language for artificial intelligence, which can be used to build a simple bot from the ground up in no time at all. ALICE has won the Loebner Prize three times, given out each year to the AI chatbot deemed to be the most lifelike. A conventional Turing test serves as the basis for the competition's framework (Boucher et al., 2021).

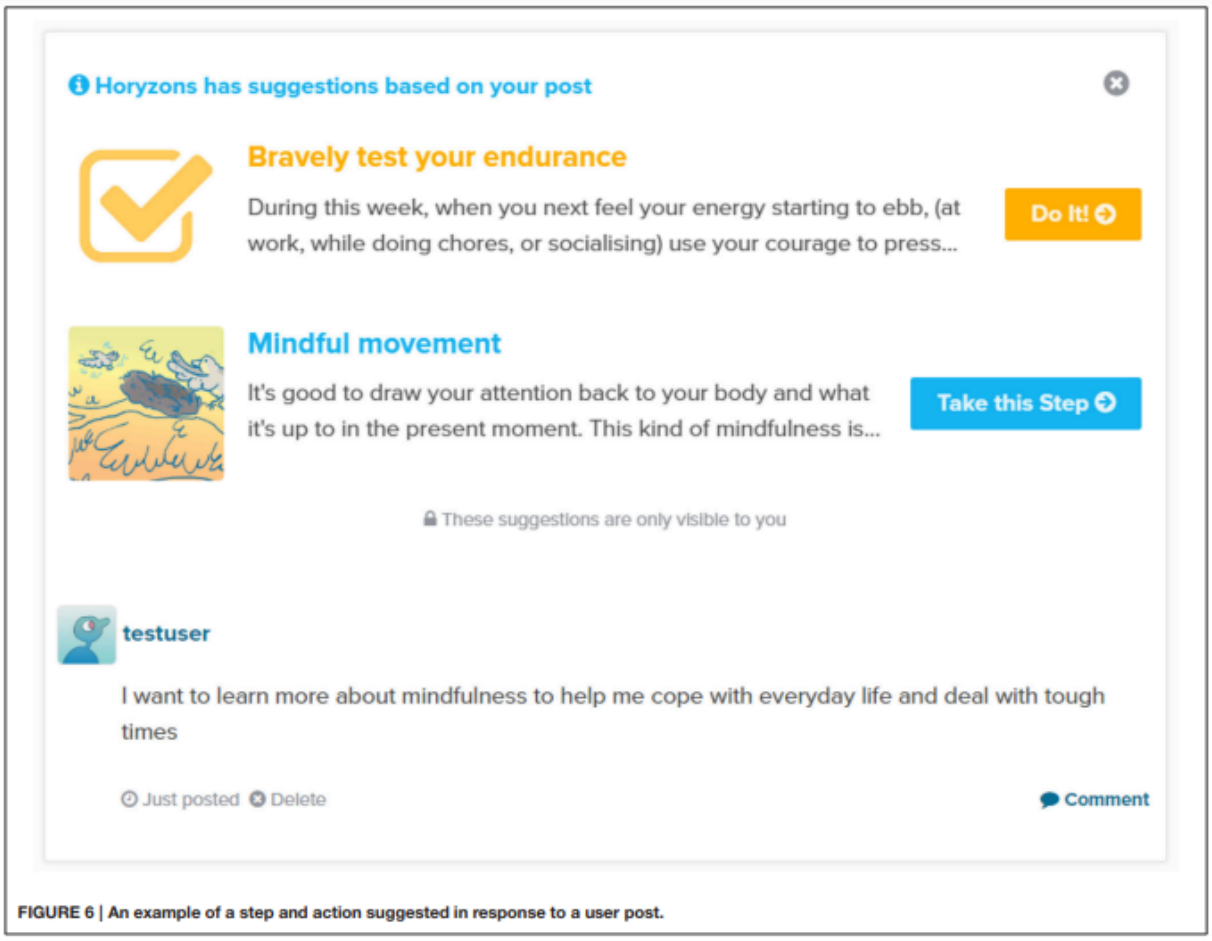

Figure 6 User post.

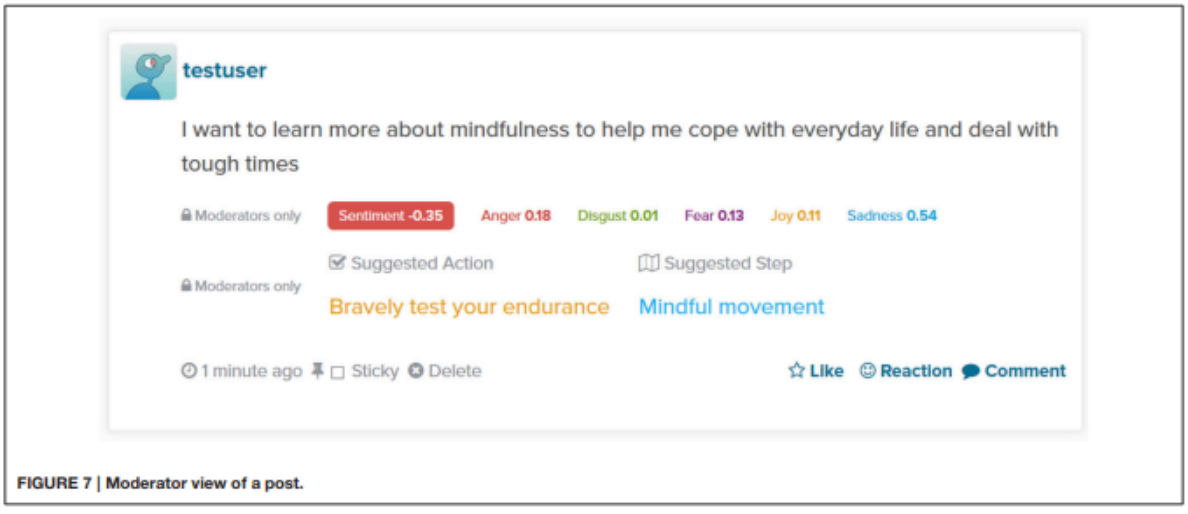

Figure 7 Moderator View

Conclusion/Future work

Through a series of research studies, the revolutionary MOST system has shown its worth. It combines online peer support, evidence-based therapies, and a unique clinician and consumer-centered service delivery method. Incorporating modern computational and artificial intelligence technologies is a key next stage in the system's progress, given the data-driven potential it affords and the objective to deploy it on a bigger scale. The primary aims of our treatments, which include improving user engagement, making it easier to find and provide personalized therapeutic material, and encouraging autonomy, competence, and relatedness, will be advanced in large part by this innovation. As a bonus, it can work in tandem with human censors or even take their place. In the end, this effort will result in a system that can better handle large-scale mental health services and long-term assistance, since it is designed to be more scalable. Among our ongoing projects is the creation of systems that can analyze user preferences and histories in addition to the language used in newsfeed posts to provide personalized therapeutic recommendations. This is an example of how user content analysis may feed information retrieval services; it comes within the larger field of applying computational language analysis to anticipate or detect psychological states and attributes. As they move from controlled trials with a small group of participants who all have the same known mental health condition to more general, publicly used sites where users will have a variety of conditions and are not pre-known trial participants, the possibility of delivering therapy content that is specifically relevant to a certain condition based on analysis of a user's content arises.

Author Contributions

The final manuscript has been approved by all authors, and all authors had a significant hand in doing the study and/or writing it.

SD developed the software, wrote the algorithms, and analyzed the data; he is also the article's major author. OS helped with both the data analysis and the article's drafting and editing. Conceptually, SR, GW, and RL aided with the novel approach and research, read the paper draft and were consulted as necessary. CM was an integral part of the team that created the primary features detailed in this article. The grant application, the project's idea and design, the study's execution, supervision, and revisions to both the first and final versions were all contributions of MA and JG.

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